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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/027,007 | 12/26/2001 | Masanobu Miyashita | P/2278-36 | 1127 |

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| EXAMINER | |
|---|---|
| MACKOWEY, ANTHONY M | |
| ART UNIT | PAPER NUMBER |
| 2623 | |

DATE MAILED: 02/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/027,007 | MIYASHITA, MASANOBU | |
| | Examiner | Art Unit | |
| | Anthony Mackowey | 2623 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *26 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4 and 8* is/are allowed.

6)☒ Claim(s) *1-3 and 5-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/26/2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,081,606 to Hansen et al. (Hansen).

As to claim 1, Hansen discloses an adaptive motion direction detecting apparatus (col. 2, lines 61-62) comprising:

an image input unit for inputting two-dimensional pixel data of an object (col. 2, lines 62-67, Hansen teaches an image source providing two-dimensional image data to the apparatus.);

a response output unit including a plurality of response element arrays each having different time phases (col. 3, lines 33-54, Hensen teaches producing difference images created from an image sequence, theses images depicting the moving objects at different times.), each of said response element arrays including a plurality of response elements each generating a response output for one of a plurality of local areas partly superposed thereon (col. 3, lines 33-54, The difference images are created by subtracting images from a sequence and filtering, this is done pixel by pixel, thus pixel values of the difference images are in response to the subtraction and filtering functions and would be considered response elements.), said two-dimensional pixel data being divided into said local areas (col. 5, lines 37-39, Hansen teaches the images are partitioned into local areas.);

a correlation function calculating unit (col. 5, lines 15-16) for calculating spatial and time correlation functions between the response output of said response elements (col. 5, lines 15-27, 39-43, Hensen teaches the difference images are shifted with respect to one another and with each shift a correlation value is generated for each local region. Each image represents a different time in a sequence, shifting is in the spatial domain and is performed on one image with respect to another, therefore the correlation function taught by Hensen is a spatial and time correlation function.);

a response output selecting unit for selecting response outputs of said response output unit for each of said local areas in accordance with said spatial and time correlation functions (col. 6, lines 19-25, Hensen teaches the flow field estimator determines (selects) the maximum correlation value for each local area.); and

a motion direction detecting unit including a plurality of detection element, each corresponding to one of said response elements of each of said response element arrays, each of said detection elements detecting a motion direction of said object at one of said local areas in accordance with selected response outputs for said one of said local areas (col. 6, lines 19-25, Hensen teaches interpolating about the maximum correlation values for each local area to determine the motion estimation (motion direction).).

As to claim 5, Hensen discloses an adaptive motion direction detecting method (abstract, lines 1-2) comprising the steps of:

inputting two-dimensional pixel data of an object (col. 2, lines 62-67, Hansen teaches an image source providing two-dimensional image data to the apparatus.);

generating response output for one of a plurality of local areas partly superposed thereon (col. 3, lines 33-54, Hensen teaches producing difference images created from an

image sequence, theses images depicting the moving objects at different times.), each of said response element arrays including a plurality of response elements each generating a response output for one of a plurality of local areas partly superposed thereon (col. 3, lines 33-54, The difference images are created by subtracting images from a sequence and filtering, this is done pixel by pixel, thus pixel values of the difference images are in response to the subtraction and filtering functions and would be considered response elements.), said two-dimensional pixel data being divided into said local areas (col. 5, lines 37-39, Hansen teaches the images are partitioned into local areas.);

calculating spatial and time correlation functions between the special and time correlation functions between the response outputs (col. 5, lines 15-27, 39-43, Hensen teaches the difference images are shifted with respect to one another and with each shift a correlation value is generated for each local region. Each image represents a different time in a sequence, shifting is in the spatial domain and is performed on one image with respect to another, therefore the correlation function taught by Hensen is a spatial and time correlation function.);

selecting response outputs for each of said local areas in accordance with said spatial and time correlation functions (col. 6, lines 19-25, Hensen teaches the flow field estimator determines (selects) the maxim correlation value for each local area.); and

detecting a motion direction of said object at one of said local areas in accordance with selected response output for said one of said local areas (col. 6, lines 19-25, Hensen teaches interpolating about the maximum correlation values for each local area to determine the motion estimation (motion direction).).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hensen in view of U.S. Patent 4,616,931 to Studer.

As to claims 2 and 6, Hensen discloses the apparatus and method as set forth in claims 1 and 5, but is silent with regard to the time phases being 0°, 90°, 180° and 270°. However, Studer discloses an process and device for 8-25, Fig. 4, It can be clearly seen in Figure 4, that signals A+B, A+D, C+D, and B+C are phase shifted 90° from each other respectively.)

The teachings of Hensen and Studer are combinable because they are both in the same field of endeavor, determination of movement of an object in images. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the sequential images as taught by Hensen have different time phases of 0°, 90°, 180° and 270° as taught by Studer because it would increase the amplitude of the signal and remove interference (Studer, col. 3, lines 25-28) when computing the difference images taught by Hensen.

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hensen in view of the book The Image Processing Handbook by John C. Russ (Russ).

As to claims 3 and 7, Hensen discloses the apparatus and method as set for in claims 1 and 5, but is silent with regard to dividing the two-dimensional pixel data into said local areas by performing a Gaussian function upon said two-dimensional pixel data. Russ teaches a Gaussian

"shape" for a weighting kernel is very useful in neighborhood (local area) operations (page 157, lines 24-25).

The teachings of Hensen and Russ are combinable because they are both concerned with image processing techniques. It would have been obvious to one of ordinary skill in the art at the time the invention was made to divide the two-dimensional data into local areas as taught by Hansen by performing a Gaussian function as taught by Russ. One would have been motivated to do so because a Gaussian function takes into account the distance a pixel is from the center of the neighborhood (local area) (Russ, page 157, lines 12-15), is symmetrical about the center point (therefore simple compared to more complex weighting schemes), and is easily implemented on a computer.

***Allowable Subject Matter***

Claims 4 and 8 are allowed.

Claims 4 and 8 contain specific functions, which are clearly defined in the specification. The limitations of the claims utilizing these specific functions are not disclosed in closest prior art.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,122,320 to Bellifemine et al. is cited for teaching motion estimation in video sequences taking into account temporal and spatial correlations into account.

U.S. Patent 5,929,913 to Etoh is cited for teaching motion vector detection including motion vectors in neighboring blocks.

U.S. Patent 5,832,101 to Hwang et al. is cited for teaching a device and method for detecting a motion vector of an image using correlation values.

U.S. Patent 6,160,901 to Kage is cited for teaching determining direction of motion in an image by estimating the motion vectors in a local area.

U.S. Patent 6,345,106 to Borer is cited for teaching motion estimation using gradients.

U.S. Patent 6,668,070 to Kondo et al. is cited for teaching motion direction detection in images using scoring factors to determine the motion direction of a pixel of interest.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Mackowey whose telephone number is (703) 306-4086. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AM
2/14/2005

Jon Chang
Primary Examiner